

DETAILED ACTION

1. Applicants' arguments, filed December 13, 2007, have been fully considered and they are deemed to be persuasive in-part. However, upon further consideration, new grounds of rejection are made in view of the prior art. The following rejections and/or objections are either reiterated or newly applied. They constitute the complete set presently being applied to the instant application.

Status of the Claims

Claims 1-30 and 35-47 are under examination.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. The replacement drawings were received on December 13, 2007. These drawings are accepted.

Information Disclosure Statement

4. The references on page 3 of the Information Disclosure Statement filed February 10, 2005 have been lined through because the references were considered in the previous office action.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-11, 17-25, and 42-45 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for *in vivo* antlers and *in vitro* antlers that are warming or cooling, does not reasonably provide enablement for *in vitro* antlers that of the same uniform temperature. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims.

Factors to be considered in determining whether a disclosure would require undue experimentation have been summarized in Ex parte Forman, 230 USPQ 546 (BPAI 1986) and reiterated by the Court of Appeals in In re Wands, 8 USPQ2d 1400 at 1404 (CAFC 1988). The factors to be considered in determining whether undue experimentation is required include:

(1) the quantity of experimentation necessary - Antlers of different compositions but of the same uniform temperature appear to be the same in a thermographic image. Since such antlers are indistinguishable in the thermographic image, one of skill in the art would have to conduct further experimentation to determine the composition of the antlers.

(2) the amount of direction presented – There is no direction presented in regard to antlers of the same uniform temperature.

(3) the presence or absence of working examples - There are examples using warming or cooling *in vitro* antlers or *in vivo* antlers, but there are no examples where the antlers are of a uniform temperature.

(4) the nature of the invention – The invention relies on thermographic images to provide data on the composition of antlers.

(5) the state of the prior art – The prior art does not reveal any teachings of using thermographic images to determine the composition of antlers of uniform temperature.

(6) the relative skill of those in the art – The relative skill of those in the art is high.

(7) the predictability or unpredictability of the art – The art is predictable, if the required data is provided.

(8) the breadth of the claims – The claims are drawn to predicting the composition of antlers using thermographic images.

An infrared thermographic image is an image of different temperatures. The Specification, on page 27, explains that antlers are composed of materials of different densities and heat capacities heat or cool at different rates. Thus, an antler displays different infrared thermographic heat characteristics when the antler was warmed over five hours. These differential infrared thermographic heat characteristics can be used to determine the composition of the antler. However, the differential infrared thermographic heat characteristics would not be observed if there is no heating or

cooling of the antler. If antlers of a different composition are of the same uniform temperature, the antlers would appear to be the same in an infrared thermographic image. Without the differential thermographic heat characteristics, the composition of the antlers could not be determined. Without heating or cooling, the infrared thermographic image cannot provide data required to determine the composition of the antler. One of skill in the art would not have the necessary data to determine the composition of the antler and must conduct further undue experimentation in order to determine the composition of the antler.

Claim Rejections - 35 USC § 112, 2nd Paragraph

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-11, 17-25, and 42-45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-11, 17-25, and 42-45 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: the steps required to generate a temperature gradient in the antler. The instant claims require obtaining a thermographic sample image of an antler. In the case of an *in vitro* sample, the antler may be of a uniform temperature which would produce a uniform thermographic image. However, a uniform thermographic image would not provide the

data required to determine the composition of an antler. For example, an antler of high degree of mineralization of a uniform temperature would appear to be the same in a thermographic image of an antler of a low degree of mineralization of the same uniform temperature. Thus, *in vitro* antlers must be exposed to some sort of temperature change in order to provide data for determining the composition of the antler.

Claim Rejections - 35 USC § 101

9. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claims 1-30 and 35-47 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The instant claims are drawn to a process involving the judicial exception of a computational algorithm. Claims drawn to a judicial exception is non-statutory unless the claims include a practical application of that judicial exception as evidenced by a physical transformation of matter, or if the claimed invention recites a useful, tangible and concrete final result. In the instant claims, there is no physical transformation by the claimed invention, thus the Examiner must determine if the instant claims produce a useful, tangible, and concrete final result. See MPEP 2106.

The instant claims do not require a tangible final result. A tangible final result requires that the claim must set forth a practical application of the mathematical algorithm that a communicated to the real world. In the instant case the claimed method has the final step of outputting to a computer, memory, display or printer. While

outputting to a display or printer is a tangible final result, outputting to a computer or memory is not. Outputting to a computer or memory does not necessarily communicate the final result to the outside world. Rather, the process may take place entirely within a computer and never be communicated. Thus, outputting to a computer or memory does not limit the claim to embodiments of a tangible final result. Examples of amendments to overcome this rejection include amending the claims to identify/recite a concrete result and to recite that the result is outputted to a display or to a user or outputted in a user readable format. However, applicant is reminded that any amendment must be fully supported and enabled by the originally filed disclosure.

Claims 35-41 are drawn to the method of claim 1 embodied on an apparatus. Although the claims are drawn to an apparatus, the method embodied on that apparatus must still have a useful, concrete, and tangible final result. As explained above, the method does not have a tangible result and is non-statutory. Thus, the apparatus is also non-statutory.

Response to Arguments

11. Applicants had responded to this rejection by amending the claims to include the step of outputting the predicted value to a computer, memory, display or printer. As explained above, outputting to a computer or memory does not necessarily lead to a tangible final result, and thus must be rejected as reading on non-statutory subject matter.

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12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 1-30 and 35-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schaefer et al. (US 6,123,451) in view of Cho et al. (Microchemical Journal (2001) Volume 68, pages 189-195.)

The instant claims are drawn to a method and an apparatus for performing that method that includes the steps of selecting a sample population of antlers, obtaining an infrared thermographic sample image of each antler, calculating a value of at least one statistical measure of the temperature, conducting an assay to obtain the known value of the composition, determining the relationship between the temperature and the known value of the composition to create a predictive model, obtaining an infrared

thermographic test image from a test antler, calculating the value of one statistical measure of the temperature, using the predicative model to provide the predicted composition of the test antler, and outputting the predictive value to a computer, memory, display or printer. For purposes of this rejection, the instant claims will be interpreted to include where the *in vitro* sample is subjected to cooling or warming.

Regarding claims 1 and 35, Schaefer et al. teaches a method and apparatus (column 4, lines 21-65) for determining tissue composition that includes that steps of obtaining one infrared thermographic sample image of a sample where the image is represented as an array of pixels providing temperature data (column 4, lines 24-42); calculating a value of at least one statistical measure (column 4, lines 24-42); conducting an assay to obtain a known value of the composition characteristic (column 7, line 55-column 8, line 51); determining the relationship between the temperature input variable and the known composition characteristic to generate a predictive model (column 4, lines 24-42; column 8, line 27-column 9, line 14); obtaining an infrared thermographic test image from a test sample (column 8, line 52-column 9, line 14); calculating the value of the at least one statistical measure of temperature data for the test image (column 9, lines 1-6); using and solving the predictive model to provide a predicted value of composition of the test sample (column 9, lines 1-15); and outputting the predicted value of the composition characteristic (column 9, lines 1-15).

Although, Schaefer et al. teaches that their method may be applied to deer (column 5, lines 2-5), they do not specifically teach applying their method to antlers.

Regarding claims 1 and 35, Cho et al. teaches using Near-Infrared spectroscopy to evaluate velvet deer antler.

Regarding claims 2, 3, 36, and 37, Cho et al. teaches where the composition is ash (abstract).

Regarding claim 4, 5, 38 and 39 Schaefer et al. teaches where the non-temperature input variables is not derived from infrared thermography such as animal weight (column 8, lines 7-17).

Regarding claim 6, 42, and 43, Cho et al. teaches where the animal is a *Cervus elaphus xanthopygus* (i.e. *cervus elaphus* from China).

Regarding claims 7-13, 40, and 41, Schaefer et al. teaches where the image is a dorsal, lateral, distal or proximal view (column 7, lines 35-43); where the statistical measure is the mean temperature or measure of central tendency (column 7, line 55-column 8, line 6); where the statistical technique is multiple linear regression (column 8, line 45-51); where the samples are *in vivo* or *in vitro* (column 8, lines 55-61); where the samples are subjected to temperature change (i.e. the cooling of carcasses after slaughter) (column 8, line 65-column 9, line 2)

It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the data of antlers into the method taught by Schaefer et al. Schaefer et al. teaches a broad method of determining tissue composition of an animal such as deer (column 5, lines 2-5) using infrared thermographic images (column 4, lines 21-65). This is possible, because tissue is composed of different materials with different specific heats and different heat capacities (column 3, lines 5-25). Similarly, antlers are

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composed of different materials (Cho et al., page 190) which have different heat capacities. Thus, one of ordinary skill in the art would expect an infrared thermographic image of antlers to show the different temperatures. This infrared thermographic image may be used in the method taught by Schaefer et al. to determine the composition of the antler. Thus it would have been obvious to one of ordinary skill in the art to substitute the antler of Cho et al. in to the method of Schaefer et al. for the predictable result of determining the composition of the antler.

Withdrawn Rejections

14. Applicant's arguments and amendments, filed December 13, 2007, with respect to the rejections made under 35 U.S.C. §112 2nd in office action mailed 7/16/2007, have been fully considered and are persuasive. The amendments to the claims have overcome these rejections. These rejections have been withdrawn.

Conclusion

No claim is allowed.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry Lin whose telephone number is (571)272-2561. The examiner can normally be reached on 7:00-5:30pm, M-TH.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie A. Moran can be reached on (571) 272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jerry Lin/
Examiner, Art Unit 1631
4/8/2008